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(54) INK JET RECORDING INK

(57)Abstract:

PURPOSE: To obtain an ink composition excellent in various characteristics, esp. capable of realizing low-blur printing.

CONSTITUTION: This ink jet recording ink composition contains a dye, propylene glycol mono-n-butyl ether (PGmBE) and/or dipropylene glycol mono-n-butyl ether (DPGmBE) and other water-soluble glycol ether(s). The sum of the PGmBE and DPGmBE accounts for 3-30wt.% of this ink composition.

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CLAIMS

[Claim(s)]

[Claim 1] The ink constituent whose total quantity of PGmBE and DPGmBE it is the ink constituent for ink-jet record which comes to contain a color, a propylene-glycol monochrome-n-butyl ether (PGmBE) and/or a dipropylene-glycol monochrome-n-butyl ether (DPGmBE), and water-soluble glycol ethers other than PGmBE and DPGmBE, and is 3 – 30 % of the weight on ink constituent criteria.

[Claim 2] The ink constituent according to claim 1 whose total quantity of PGmBE and DPGmBE is 3 – 10 % of the weight on ink constituent criteria.

[Claim 3] The ink constituent according to claim 1 whose water-soluble glycol ether is what is chosen from ethylene glycol monoalkyl ether, diethylene-glycol monoalkyl ether, triethylene-glycol monoalkyl ether, propylene-glycol monoalkyl ether, dipropylene-glycol monoalkyl ether, and the group that consists of alkoxy substitution fatty alcohol.

[Claim 4] The ink constituent according to claim 1 whose water-soluble glycol ether is what is chosen from the group which consists of ethylene glycol monochrome C1–6 alkyl ether, diethylene-glycol monochrome C1–6 alkyl ether, triethylene-glycol monochrome C1–6 alkyl ether, propylene-glycol monochrome C1–6 alkyl ether, dipropylene-glycol monochrome C1–6 alkyl ether, and C1–6 alkoxy substitution C1–6 fatty alcohol.

[Claim 5] The ink constituent according to claim 1 whose ratio of the addition of the water-soluble glycol ether to PGmBE and DPGmBE is 0.5 or more.

[Claim 6] The ink constituent according to claim 1 whose amount of a water-soluble glycol ether is 5 – 60 % of the weight on ink constituent criteria.

[Claim 7] The ink constituent according to claim 1 which comes to contain a urea and/or a urea denaturation object further.

[Claim 8] The ink constituent according to claim 7 whose urea denaturation object is an ethylene urea, thiourea, BIUREA, a biuret, or a tetramethylurea.

[Claim 9] The ink constituent according to claim 7 whose amount of a urea and/or a urea denaturation object is 2 – 20 % of the weight on ink constituent criteria.

[Claim 10] The ink constituent according to claim 1 which comes to contain a thiodiglycol further.

[Claim 11] The ink constituent according to claim 10 whose amount of a thiodiglycol is 0.5 – 30 % of the weight on ink constituent criteria.

[Claim 12] The ink constituent according to claim 1 which comes to contain a surfactant further.

[Claim 13] The ink constituent according to claim 12 whose surfactant is a fluorochemical surfactant.

[Claim 14] The ink constituent according to claim 13 whose concentration of a fluorochemical surfactant is 1–10,000 ppm.

[Claim 15] The ink constituent according to claim 13 whose fluorochemical surfactant is an amphoteric surface active agent or a nonionic surfactant.

[Claim 16] The ink constituent according to claim 1 the initial value of 200mm or less and whose value of 5 minutes after the whippability in 15 degrees C by the loss mile method is 100mm or

less.

[Claim 17] The ink constituent according to claim 1 whose surface tension is 15 – 40 mN/m.

[Claim 18] The ink constituent according to claim 1 whose advance contact angle to the nozzle side of the head for ink-jet record is 10 – 50 degrees.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

Background of the Invention]

The field this invention of invention relates to the ink for ink-jet record.

[0002] Various properties are required of the ink for background technical ink-jet record. For example, in various record media, realization of few printing of bleeding is required of the ink for ink-jet record. In order to stop this bleeding, various ink constituents are proposed (for example, JP,2-2907,B, JP,1-15542,B, JP,2-3837,B).

[0003] Furthermore, the permeability of an ink constituent is raised and the proposal which makes bleeding the method of prevention is also made. For example, the ink constituent which added the diethylene-glycol monobutyl ether is indicated by U.S. Pat. No. 5156675. Moreover, the ink constituent which added the surfactant is indicated by U.S. Pat. No. 5183502.

Furthermore, the ink constituent which added the diethylene-glycol monobutyl ether and the surfactant is indicated by U.S. Pat. No. 5196056. Here, the diethylene-glycol monobutyl ether is called butyl carbitol, for example, is indicated by U.S. Pat. No. 3291580. Furthermore, the ink constituent which added the diethylene glycol ether is indicated by U.S. Pat. No. 2083372.

[0004] According to these ink constituents, although suppression of fixed bleeding is realized, the ink constituent with still less bleeding is called for.

[0005] On the other hand, recycled paper is used abundantly from a viewpoint of environmental protection recently. It will consist of a component of various papers, and the osmosis speed of the ink to the component will differ, consequently bleeding of printing will generate these recycled paper. In order to prevent bleeding in such recycled paper, the method of heating the recording paper in the case of printing is proposed. However, fixed time is taken to heat paper to predetermined temperature to this method. Moreover, power consumption becomes large and is not economical. Furthermore, heating worries also about degradation of the recording paper and printing.

[0006] Performances — that the still better printing concentration to the ink constituent for ink-jet record is obtained, that intermittent printing time has been stable for a long time, and it is hard to start the blinding of a nozzle — are required.

[0007]

[Summary of the Invention] Therefore, this invention sets offer of the ink constituent for ink-jet record excellent in various properties as the purpose. this invention especially sets offer of the ink constituent for ink-jet record which can realize few printing of bleeding as the purpose.

[0008] that whose total quantity of PGmBE and DPGmBE the ink constituent for ink-jet record by this invention is an ink constituent for ink-jet record which comes to contain a color, a propylene-glycol monochrome-n-butyl ether (PGmBE) and/or a dipropylene-glycol monochrome-n-butyl ether (DPGmBE), and water-soluble glycol ethers other than PGmBE and DPGmBE, and is 3 – 30 % of the weight on ink constituent criteria — it comes out

[0009]

[Detailed Description of the Invention] The ink constituent by this invention comes to contain PGmBE and/or DPGmBE on ink constituent criteria five to 10% of the weight preferably 3 – 30 %

of the weight of total quantities. Bleeding in the recording paper can be effectively suppressed because PGmBE and/or DPGmBE are in the above-mentioned range.

[0010] In addition to PGmBE and/or DPGmBE, the ink constituent by this invention comes to contain water-soluble glycol ethers other than PGmBE and DPGmBE further.

[0011] Although not necessarily restrained by the following theory, it is combining PGmBE and DPGmBE, and a water-soluble glycol ether, and it is thought that the addition of said PGmBE and DPGmBE is realizable. PGmBE and DPGmBE show only low solubility to water. For example, if independent, when it is 5 – 6% and the ink constituent component of others, such as a color, exists to water, this invention persons are checking falling to less than about 2%. However, the above-mentioned addition of PGmBE and DPGmBE is realizable by adding a water-soluble glycol ether in this system. In addition to it, an improvement of many properties of an ink constituent can be aimed at. Specifically, printing without bleeding can be obtained.

[0012] As a desirable example of these water-soluble glycols Ethylene glycol monoalkyl ether and diethylene-glycol monoalkyl ether Triethylene-glycol monoalkyl ether and propylene-glycol monoalkyl ether Dipropylene-glycol monoalkyl ether and alkoxy substitution fatty alcohol are mentioned. More preferably Ethylene glycol monochrome C1–6 alkyl ether Diethylene-glycol monochrome C1–6 alkyl ether and triethylene-glycol monochrome C1–6 alkyl ether Propylene-glycol monochrome C1–6 alkyl ether, dipropylene-glycol monochrome C1–6 alkyl ether, and C1–6 alkoxy substitution C1–6 fatty alcohol are mentioned. As an example of these water-soluble glycols An ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, An ethylene glycol monobutyl ether, ethylene-glycol-monomethyl-ether acetate, The diethylene-glycol monomethyl ether, a diethylene glycol monoethyl ether, The diethylene-glycol monochrome-n-propyl ether, the ethylene glycol monochrome-iso-propyl ether, The diethylene-glycol monochrome-iso-propyl ether, an ethylene glycol monochrome-n-butyl ether, A diethylene-glycol monochrome-n-butyl ether, an ethylene glycol monochrome-t-butyl ether, A diethylene-glycol monochrome-t-butyl ether, the triethylene-glycol monobutyl ether, 1-methyl-1-methoxybutanol, a propylene glycol monomethyl ether, The propylene-glycol monoethyl ether, a propylene-glycol monochrome-t-butyl ether, The propylene-glycol monochrome-n-propyl ether, the propylene-glycol monochrome-iso-propyl ether, The dipropylene-glycol monomethyl ether, the dipropylene-glycol monoethyl ether, the dipropylene-glycol monochrome-n-propyl ether, the dipropylene-glycol monochrome-iso-propyl ether, etc. are mentioned.

[0013] Although the addition of this water-soluble glycol ether may be suitably determined in the range which the osmosis speed of ink comes out enough, and does not have PGmBE and DPGmBE phase separation ***** in an ink constituent, it is 5 – 15 % of the weight more preferably five to 60% of the weight on ink constituent criteria.

[0014] Moreover, as for this water-soluble glycol ether, according to the desirable mode of this invention, amount addition of 0.8–3 is preferably carried out 0.5 or more to the total quantity of PGmBE and DPGmBE. If a water-soluble glycol ether is in the above-mentioned range, the phenomenon in which can raise the dissolution stability of PGmBE and DPGmBE, and the amount of [in an ink constituent / some] oil fusing oozes out on a record medium around printing can be prevented. Furthermore, a glycol-ether smell can be reduced.

[0015] According to the mode with a still more desirable this invention, the ink constituent by this invention may contain the urea and/or the urea denaturation object. Also unexpectedly by addition of this urea and/or a urea denaturation object, improvement in printing concentration and prevention of the blinding of an ink delivery were able to be aimed at. As an example of a urea denaturation object, an ethylene urea, thiourea, BIUREA, a biuret, or a tetramethylurea is mentioned. Although it may be suitably determined in the range which the printing concentration of the addition of this urea and/or a urea denaturation object of an ink constituent improves, or the blinding of a nozzle can prevent effectively, it is about 5 – 10 % of the weight more preferably two to 20% of the weight on ink constituent criteria.

[0016] According to the mode with a still more desirable this invention, the ink constituent by this invention may contain the thiodiglycol further. Also unexpectedly by addition of this thiodiglycol, extension of intermittent printing time was able to be aimed at. Here, when intermittent printing time does not perform the regurgitation of ink but resumes printing behind,

it means the time which can print by there being nothing about trouble, such as blinding. If it is in an ink-jet record printer, the regurgitation of ink is performed for every fixed time so that near a nozzle may dry and blinding may not be started. Generally this operation is called Flushing (flushing) operation. The interval which performs this Flushing operation as intermittent printing time is a long ink constituent can be set up for a long time. Consequently, since the futility of an ink constituent decreases and printing speed can be made quick, it is advantageous. Addition of this thiodiglycol is still more advantageous also at the point which can raise the stability of an ink constituent.

[0017] Moreover, according to the desirable mode of this invention, the ink constituent by this invention may contain the surfactant further. The performance of ink constituents, such as improvement in intermittent printing time, can be raised by addition of a surfactant. As an example of a desirable surfactant, an anionic surface active agent, an amphoteric surface active agent, a cationic surface active agent, a nonionic surface active agent, etc. are raised. As an anionic surface active agent, an alkyl SURIHO carboxylate, alpha-olefin sulfonate, Polyoxyethylene-alkyl-ether acetate, N-acylamino acid, and its salt, N-acyl methyl taurine salt, alkyl-sulfate polyoxy alkyl ether sulfate, Alkyl-sulfate polyoxyethylene-alkyl-ether phosphate, rosin acid soap, A castor-oil sulfate salt, a lauryl alcohol sulfate salt, an alkylphenol type phosphoric ester, an alkyl type phosphoric ester, alkylaryl sulfonates, a diethyl sulfo succinate, a diethyl hexyl sulfo succinate dioctyl sulfo succinate, etc. are mentioned. As a cationic surface active agent, there are a 2-vinylpyridine derivative, a poly 4-vinylpyridine derivative, etc. As an amphoteric surface active agent, there are lauryldimethyl betaine aminoacetate, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, a palm-oil-fatty-acid amide propyl dimethylamino acetic-acid betaine, another poliomyelitis KUCHIRUPORI aminoethyl glycine and imidazoline derivative, etc. As a nonionic surface active agent, the polyoxyethylene nonylphenyl ether, A polyoxyethylene octyl phenyl ether, a polyoxyethylene dodecyl phenyl ether, Polyoxyethylene alkyl aryl ether, the polyoxyethylene oleyl ether, The polyoxyethylene lauryl ether, polyoxyethylene alkyl ether, Ether systems, such as polyoxyalkylene alkyl ether, polyoxyethylene oleic acid, A polyoxyethylene oleate, polyoxyethylene distearic acid ester, Sorbitan laurate, sorbitan monostearate, sorbitan monooleate, Ester systems, such as sorbitansesquiolate, polyoxyethylene monooleate, and polyoxyethylene stearate, 2, 4, 7, the 9-tetramethyl-5-crepe de Chine -4, 7-diol, 3, the 6-dimethyl-4-octyne -3, 6-diol, Acetylene glycol systems, such as all [5-dimethyl-1-hexyne-3 / 3 and] For example, (Nissin Chemical SAFI Norians 104, 82, and 465, TG), etc., Fluorochemical surfactants, such as fluorine substitution alkyl ester and a perfluoroalkyl carboxylate for example, the FUTAJIENTO series made from NEOSU, Inc. and the loader in series made from Ciba-Geigy -- The Du Pont Zonyl series, the MONFUROA series made from ICI, the Sir chlorofluocarbon series by Asahi Glass Co., Ltd., the uni-dyne series by Daikin Industries, LTD., or the Sumitomo 3M FC series is mentioned. Use of a fluorochemical surfactant especially amphoteric, or a nonionic surfactant is especially desirable. Although the addition of a surfactant may be determined suitably, in the case of a fluorochemical surfactant, about 1-10,000 ppm is desirable.

[0018] According to the mode with a still more desirable this invention, the ink constituent by this invention may contain the water-soluble organic solvent further. As an example of such a water-soluble organic solvent, ethanol, a methanol, The alkyl alcohols of the carbon numbers 1-4, such as a butanol, propanol, and an isopropanol Ethylene glycol, a diethylene glycol, a triethylene glycol, A with a molecular weight of 600 or less polyethylene glycol, a propylene glycol, A dipropylene glycol, tripropylene glycol, a with a molecular weight of 400 or less polypropylene glycol, 1, 3-butylene glycol, 1, 3-propanediol, 1, 4-butanediol, 1,5-pentanediol, 1, 6-hexandiol, a thiodiglycol, Polyhydric alcohol, such as a glycerol, meso erythritol, and a pentaerythritol, or glycols, a formamide, an acetamide, dimethyl sulfo KIJIDO, a sorbitol, sorbitan, a glyceryl monoacetate, a diacetin, a triacetin, a sulfolane, etc. are mentioned.

[0019] Moreover, the ink constituent by this invention can contain various additives, in order to improve the various properties of an ink constituent. As an example of an additive, antiseptics, an antifungal agent, pH regulator, a viscosity controlling agent, etc. are mentioned. Specifically, rest *** sodium, pentachlorophenol sodium, 2-pyridine thiol-1-oxide sodium, sol bottle acid

sodium, TEHIDORO sodium acetate, 1, and 2-JIBENJISO thiazoline-3-ON (pro cheating-on-the-fare XL—the pro cheating on the fare CRL made from ICI, the pro cheating on the fare BDN, the pro cheating on the fare GXL, 2, pro cheating on the fare TN) etc. can be added as antiseptics and an antifungal agent.

[0020] As a pH regulator, moreover, a diethanolamine, a triethanolamine, Amines, such as a PUROHA Norian amine and a morpholine, a potassium hydroxide, Mineral, such as a sodium hydroxide and a lithium hydroxide, an ammonium hydroxide, The 4th class ammonium hydroxides (tetramethylammonium etc.), potassium carbonate, N-methyl-2-pyrrolidones, such as carbonic acid salts and other phosphate, such as a sodium carbonate and a lithium carbonate Burets, such as aloha shirt NETO, such as ureas, such as a urea, thiourea, and a tetramethylurea, aloha shirt NETO, and methyl aloha shirt NETO, a buret, a dimethyl buret, and a tetramethyl buret, can be added.

[0021] Furthermore, polyvinyl alcohol, hydroxypropylcellulose, a carboxymethyl cellulose, a hydroxyethyl cellulose, a methyl cellose, a polyacrylate, a polyvinyl pyrrolidone, gum arabic starch, etc. can be added as a viscosity controlling agent.

[0022] Although especially the coloring material used for the ink constituent by this invention is not limited, direct dye, acid dye, basic dye, a reactive dye, food coloring matter, etc. can be used.

[0023] As a desirable example As direct dye C. I. direct blacks 2, 4, 9, 11, 14, 17, 19, 22, 27, 32, 36, 41, 48, 51, 56, 62, 71, 74, 75, 77, 78, 80, 105, 106, 107, 108, 112, 113, 117, 132, 146, 154, and 168, 171, 194, the C.I. direct yellow 1, 2, 4, 8, 11, 12, 24, 26, 27, 28, 33, 34, 39, 41, 42, 44, 48, 50, 51, 58, 72, 85, 86, 87, 88, 98, 100, 110, 127, 135, 141, and 142, 144, the C.I. direct oranges 6, 8, 10, 26, 29, 39, 41, 49, 51, 62, and 102, the C.I. direct red 1, 2, 4, 8, 9, 11, 13, 15, 17, 20, 23, 24, 28, 31, 33, 37, 39, 44, 46, 47, and 48, 51, 59, 62, 63, 73, 75, 77, 79, 80, 81, 83, 84, 85, 87, 89, 90, 94, 95, 99, 101, 108, 110, 145, 189, 197, 224, 225, 226, 227, 230, 250, 256, 257, C. The I. direct violet 1, 7, 9, 12, 35, 48, 51, 90, and 94, C.I. die crate blues 1, 2, 6, 8, 12, 15, 22, 25, 34, 69, 70, 71, 72, 75, 76, 78, 80, 81, 82, 83, 86, 97, 90, and 98, 106, 108, 110, 120, 123, 158, 163, 165, 192, 193, 194, 195, 196, 199, 200, 201, 202, 203, 207, 218, 236, 237, 239, 246, 258, 287, the C.I. direct greens 1 and 6, 8, 28, 33, 37, 63, 64, C.I. direct Brown 1A, 2, 6, 25, 27, 44, 58, 95, 100, 101, 106, 112, 173, 194, 195, 209, 210, and 211, etc. are mentioned.

[0024] moreover, as acid dye C. The I. acid blacks 1, 2, 7, 16, 17, 24, 26, 28, 31, 41, 48, 52, 58, 60, 63, 94, 107, 109, 112, 118, 119, 121, 122, 131, 155, and 156, C.I. acid yellow 1, 3, 4, 7, and 11, 12, 13, 14, 17, 18, 19, 23, 25, 29, 34, 36, 38, 40, 41, 42, 44, 49, 53, 55, 59, 61, 71, 72, 76, 78, 79, 99, 111, 114, 116, 122, 135, 142, 161, 172, C. The I. acid oranges 7, 8, 10, 19, 20, 24, 28, 33, 41, 45, 51, 56, and 64, the C.I. acid reds 1, 4, 6, 8, 13, 14, 15, 18, 19, 21, 26, 27, 30, 32, 34, 35, 37, 40, 42, 44, and 51, 52, 54, 57, 80, 82, 83, 85, 87, 88, 89, 92, 94, 97, 106, 108, 110, 111, 114, 115, 119, 129, 131, 134, 135, 143, 144, 152, 154, 155, 172, 176, 180, 184, 186, 187, 249, 254, 256, 289, 317, 318C, I, The acid violet 7, 11, 15, 34, 35, 41, 43, 49, 51, and 75, the C.I. acid blues 1, 7, 9, 15, 22, 23, 25, 27, 29, 40, 41, 43, 45, 51, 53, 55, 56, 59, 62, 78, 80, 81, 83, and 90, 92, 93, 102, 104, 111, 113, 117, 120, 124, 126, 138, 145, 167, 171, 175, 183, 229, 234, 236, 249, the C.I. acid greens 3, 9, 12, 16, 19, 20, 25, 27, 41, and 44, C. I. acid Brown 4 and 14 etc. is mentioned.

[0025] moreover, as basic dye C. The I. basic blacks 2 and 8, the C.I. basic yellow 1, 2, 11, 14, 21, 32, and 36, the C.I. basic oranges 2, 15, and 21, the 22.C.I. basic red 1, 2, 9, 12, 13, and 37, C.I. basic violet 1, 3, and 7, 10, 14, the C.I. basic blues 1, 3, 5, 7, 9, 24, 25, 26, 28, and 29, the C.I. basic greens 1 and 4, C.I. basic Brown 1 and 12, etc. are mentioned.

[0026] moreover, as a reactive dye C. The I. reactive blacks 1, 3, 5, 6, 8, 12, and 14, the C.I. reactive yellow 1, 2, 3, 12, 13, 14, 15, and 17, the C.I. reactive oranges 2, 5, 7, 16, 20, and 24, C.I. reactive red 6, 7, 11, 12, and 15, 17, 21, 23, 24, 35, 36, 42, 63, 66, 84, 184, the C.I. reactive violet 2, 4, 5, 8, and 9, the C.I. reactive blues 2, 5, 7, 12, 13, 14, 15, 17, 18, 19, 20, 21, 25, 27, 28, 37, and 38, 40, 41, the C.I. reactive greens 5 and 7, C.I. reactive Brown 1, 7, and 16, etc. are mentioned.

[0027] Moreover, as a food dye, the C.I. hood blacks 1 and 2, the C.I. hood yellow 3, 4, and 5, the C.I. hood red 2, 3, 7, 9, 14, 52, 87, 92, 94, 102, 104, 105, and 106, the C.I. hood violet 2, the C.I. hood blues 1 and 2, the C.I. hood greens 2 and 3, etc. are mentioned.

[0028] Further kaya set black 009A by Nippon Kayaku Co., Ltd., the direct tape black XA, The

direct special black AXN, the special black SP liquid by the Beyer company, A vice-crypt black SP liquid, liver cell TAKOISU blue KS-6GLL, PIRANIN and the Sumitomo Chemical Co., Ltd. make — JI.BK-2, JI.BK-3, and JPK[by the Orient chemistry company]—81L — JPX-127L, JPK-139, the C.I. flow SENTOBU Lightning agents 14, 22, 24, 32, 84, 85, 86, 87, 90, 134, 166, 167, and 169,175,176,177, etc. can be used.

[0029] Although many physical properties of the ink constituent by this invention may be suitably determined that it will suit the ink-jet record method, it is desirable to take into consideration the whippability, surface tension, and the advance contact angle to the nozzle side of the head for ink-jet record especially. Specifically about whippability, it is desirable that the whippability in 15 degrees C by the loss mile method (Ross Miles Test) is the initial value of 200mm or less, and the value of 5 minutes after is 100mm or less. The loss mile method makes it flow down 200ml examination liquid here in the draw tube with a bore of 50mm which put in this 50ml examination liquid through pore with a bore of 29mm from a height of 90cm, and the method of seeing the height of a bubble is said. If initial value and the value of 5 minutes after are in the range of the aforementioned value, generating of a bubble is suppressed and a nozzle can be easily filled up with an ink constituent. Consequently, a dot omission etc. can be prevented effectively.

Moreover, as for the surface tension of an ink constituent, it is desirable that it is in the range of 15 – 40 mN/m. If surface tension is in the aforementioned range, a nozzle can be easily filled up with an ink constituent, and printing of good quality will be obtained. Furthermore, as for the advance contact angle to the nozzle side of an ink constituent, it is desirable that it is in the range of 10 – 50 degrees. If the aforementioned contact angle of an ink constituent is in the above-mentioned range, an ink constituent will wet a nozzle side uniformly and good printing will be obtained. Moreover, an advantage that intermittent printing time can be set up for a long time can also be acquired.

[0030] The ink constituent by this invention can be manufactured according to a conventional method. That is, churning mixture of the above-mentioned component is fully carried out, if required, it will filter, and except for a formed element, it considers as an ink constituent.

[0031]

[Example] Although the following examples explain this invention still in detail, this invention is not limited to these examples. in addition — unless especially printing is refused in the following examples — the SEIKO EPSON incorporated company make — ink jet printer MJ-500 performed. Moreover, it is weight % unless especially % refuses below. Furthermore, ink constituents other than Example A and the example A of comparison come to contain 0.001 – 0.005% (recording head the corrosion prevention of a member sake) of benzotriazols pro cheating-on-the-fare XL-2 (corrosion inhibitor)0.1–1%.

[0032] Example A1–8 below Example A and the ink constituent of example A of comparison1–3 were prepared according to the conventional method. That is, it agitated and mixed, and the following composition was filtered with the filter after that, and was used as the ink constituent. Example A1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Diethylene glycol monoethyl ether 10% 1, 4-butanediol 5% Sodium dioctyl sulfosuccinate 1.5% Water Residue example A2 C.I. hood black 192.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 5% Pro KUSERU GXL 0.3% Water Residue example A3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Diethylene glycol 5% Water Residue example A4 Special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 3-dimethyl-2-imidazolidinone 5% Water residue example A5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% N-methyl pyrrolidone 5% Water Residue [0033] Example A6 C.I. reactive red 6 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monochrome-n-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 15% N-acyl methyl taurine sodium 1.5% Water Residue example A7 C.I. basic yellow 11 5% Propylene-glycol monochrome-n-butyl-ether 10% Triethylene-glycol monobutyl ether 12% Glycerol 10% SAFI Norian 465 1% SAFI Norian 104 0.5% Water residue Example A8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-t-butyl ether 5% Diethylene-glycol monochrome-n-

butyl ether 5% Diethylene glycol 10% Propylene glycol monomethyl ether Residue [0034] Example A1 of comparison C.I. direct green 1 3% Diethylene-glycol monochrome-n-butyl ether 5% Tetraethylene glycol 15% Potassium hydroxide 0.1% Water Example A2 of residue comparison C. The I. direct red 227 2.5% Diethylene-glycol monochrome-n-butyl ether 15% Triethylene glycol 5% Glycerol 10% Water Example A3 of residue comparison C.I. acid red 254 2.5% Diethylene-glycol monochrome-n-butyl-ether 7% Diethylene glycol 15% Water Residue [0035] It printed on the various recording papers which show the ink constituent beyond evaluation examination A1 in the 1st table. The printing was evaluated as follows.

Uneven osmosis of bleeding ink estimated on the following criteria whether the roundness of a dot fell.

O : roundness is very good.

O : although the fall of roundness is seen a little, it is satisfactory practically.

**: The fall of roundness is seen and they are those with a problem practically.

x: The fall of roundness is remarkable and is not suitable for practical use.

[0036] Along with the fiber of mustached paper, the following criteria estimated the grade of uneven osmosis of ink, i.e., mustached **.

O : it is almost beardless and very good.

O : although a mustache is observed a little, there is no practical problem.

**: Many mustaches are observed and they are those with a problem practically.

x: Mustached generating is remarkable and is not suitable for practical use.

The above result was as being shown in the 1st next table.

[0037]

[Table 1]

第 1 表

試験項目	紙の種類	実施例 A								比較例 A		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENACH BOND 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	△
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり 紙	◎	◎	○	◎	○	◎	◎	◎	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	◎	○	×	×	×

[0038] In addition, the recording paper of front Naka is available from the following.

CONQUEROR paper: — Arjo Wigging FAVORIT X paper: — Favorit Company MODO COPY paper: — ModoRAPID COPY paper: — Igepa Company EPSON EPP paper: — SEIKO EPSON company XEROX P paper: — Fuji Xerox shrine XEROX 4024 paper: — Xerox shrine XEROX 10

paper: — Xerox shrine NEENACH BOND paper: — Kimberly-Clark RICOPY6200 paper: — Ricoh Co., Ltd. and eyebrows ****: — Honshu Paper XEROX R Co., Ltd. paper: — Xerox [0039] In the ink constituent of evaluation examination A2 example A1, the addition was changed in 2 – 35% of range, setting the addition ratio to 2:1 for the organic solvent of diethylene-glycol-monoethyl-ether and 1, and 4-butanediol (a part for the change was adjusted with water). 1micro of the ink constituent I was dropped in the DERSCHER paper in the shape of a spot, the drying time was made as measurement paper, and this was made into the penetration time. The result is shown by — of drawing 1.

[0040] Moreover, the addition was changed in the ink constituent of an example A1, replacing PGmBE10% with 10% of SAFI Norian 465, and setting the addition ratio to 2:1 for diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time of the ink constituent was measured like the above. The result is shown by O of drawing 1. Furthermore, the addition was changed in the ink constituent of an example A1, replacing PGmBE10% with 1% of SAFI Norian 465 10% of a ***** diethylene-glycol monochrome-n-butyl ether, and setting the addition ratio to 2:1 for diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time of the ink constituent was measured like the above. The result is shown as ** and ** of drawing 1, respectively.

[0041] In the ink constituent of evaluation examination A3 example A1, PGmBE and the diethylene glycol monoethyl ether changed the addition with the addition ratio of 1:1. The penetration time of the ink constituent was measured like the example A2. The result is shown as ** in drawing 2. Moreover, the penetration time of the ink constituent was measured like the above except having replaced PGmBE with DPgBE. The result is shown as O in drawing 2.

[0042] Example B1-8 below Example B and the ink constituent of example B of comparison1-3 were prepared according to the conventional method.

Example B1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Diethylene glycol monoethyl ether 10% 1, 4-butanediol 5% Urea 5% Dipropylene glycol 5% Water Residue example B-2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% dipropylene glycol 5% Urea 10% Pro KUSERU GXL 0.3% Water Residue example B3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Urea 7% Diethylene glycol 5% Water residue example B4 Special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 3-dimethyl-2-imidazolidinone 5% 5% of thiourea Water Residue example B5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% N-methyl pyrrolidone 5% Ethylene urea 5% Water Residue [0043]

Example B6 C.I. reactive red 6 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monochrome-n-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 15% N-acyl methyl taurine sodium 1.5% BIUREA 3% Water Residue example B7 C.I. basic yellow 11 5%

Propylene-glycol monochrome-n-butyl-ether 10% Triethylene-glycol monobutyl ether 12% Glycerol 10% SAFI Norian 465 1% SAFI Norian 104 0.5% Biuret 3% Water residue example B8 C.

The I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-t-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 5% Diethylene glycol 10% Tetramethylurea 3.5% Propylene glycol monomethyl ether Residue

[0044] Example B1 of comparison C.I. direct green 8 3% C.I. direct green 1 1% Diethylene-glycol monochrome-n-butyl ether 5% Tetraethylene glycol 15% Potassium hydroxide 0.1% Water

Example B-2 of residue comparison C.I. direct red 227 2.5% Diethylene-glycol monochrome-n-butyl ether 15% Triethylene glycol 5% Glycerol 10% Water Example B3 of residue comparison C.I. acid red 254 2.5% Diethylene-glycol monochrome-n-butyl ether 7% Diethylene glycol 15% Water Residue [0045] It printed on the various recording papers which show the ink constituent beyond evaluation examination B1 in the 2nd table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 2nd next table.

[0046]

[Table 2]

第 2 表

試験項目	紙の種類	実施例 B								比較例 B		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENACH BOND 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	△
	RICOPY 8200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	◎	◎	○	◎	○	◎	◎	◎	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	◎	○	×	×	×

[0047] OD value of the printing object by the ink constituent of evaluation examination B-2 example B1-8 was measured. Moreover, these ink constituents and the same ink constituent were prepared except having not added a urea or a urea denaturation object. OD value of the printing object by this ink constituent was measured. The ratio of OD value was obtained from the following formula.

the ratio of OD value — = $(A/B) \times 100 - 100$ — here, OD value when A adds a urea or a urea denaturation object, and B are OD values at the time of not adding a urea or a urea denaturation object The ratio of OD value was as follows.

[0048]

Example Ratio 1 of OD value 8.82 9.73 7.74 9.25 6.56 2.37 3.28 1.5 [0049] The addition of a urea was changed in the ink constituent of evaluation experiment B3 example B1 (the variation was adjusted with water). OD value of the printing object by the ink constituent was measured. The result met as shown in drawing 3 .

[0050] Example C1-8 below Example C and the ink constituent of example C of comparison 1-3 were prepared according to the conventional method.

Example C1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% 2-pyrrolidone 1.5% Water Residue example C2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 3% Tripropylene glycol 3% Urea 5% Water Residue example C3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Propylene glycol 5% Triethylene glycol 5% 1,5-pentanediol 5% Water A residue example C4 special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 6-hexandiol 2% Tripropylene glycol 3% 1, 3-dimethyl-2-imidazolidinone 5% Water Residue example C5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl-ether 9% Dipropylene-glycol monomethyl ether 12% 2-methyl-2, 4-pentanediol 5% 1, 2-propanediol 4% N-methyl pyrrolidone 5% Water Residue [0051] Example C6 C.I. reactive red 6 4% Propylene-glycol

monochrome-n-butyl ether 9% Dipropylene-glycol monochromen-butyl ether 5% Diethylene-glycol monochromen-butyl ether 15% Neopentyl glycol 2% 1, 3-butanediol 2% N-acyl methyl taurine sodium 1.5% Water Residue example C7 C.I. basic yellow 11 5% Propylene-glycol monochromen-butyl ether 10% triethylene-glycol monobutyl ether 12% Glycerol 10% Trimethylol-propane 3% Trimethylolethane 1% The polypropylene glycol of number average molecular weight 400 1% SAFI Norian 465 1% SAFI Norian 104 0.5% Water Residue example C8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochromen-butyl-ether 10% Diethylene-glycol monochromen-t-butyl ether 5% Diethylene-glycol monochromen-butyl ether 5% Diethylene glycol 10% Tetrapropylene glycol 2% 1, 3-propanediol 5% Water Residue [0052] Example C1 of comparison C.I. direct green 1 3% Diethylene-glycol monochromen-butyl ether 5% Ethylene glycol 15% Potassium hydroxide 0.1% Water Example C2 of residue comparison C.I. direct red 227 2.5% Diethylene-glycol monochromen-butyl ether 15% Diethylene glycol 5% Glycerol 10% Water Example C3 of residue comparison C.I. ashy dreadlocks 254 2.5% Diethylene-glycol monochromen-butyl ether 7% Diethylene glycol 15% Water Residue [0053] It printed on the various recording papers which show the ink constituent beyond the evaluation examination C in the 3rd table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 3rd next table.

[0054]

[Table 3]

第 3 表

試験項目	紙の種類	実施例 C								比較例 C		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT I 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	○	○	○	○	○	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	MEINACH BOND 紙	◎	◎	○	○	○	○	○	○	×	△	△
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	◎	◎	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	○	○	○	○	○	×	×	×

[0055] Example D1-8 below Example D and the ink constituent of example D of comparison 1-3 were prepared according to the conventional method.

Example D1 C.I. direct black 19 2% Propylene-glycol monochromen-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% Thiodiglycol 5% Water Residue example D2 C.I. hood black 2.2.5% Propylene-glycol monochromen-butyl ether 10% Diethylene-glycol monochromen-n-butyl ether 10% Dipropylene glycol 3% Thiodiglycol 3% Urea 5% Water Residue example D3 C.I. acid green 9 A 2.5% propylene-glycol monochromen-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Propylene glycol 5% Thiodiglycol 5% 1,5-pentanediol

5% Water Residue example D4 Vice crypt black SP liquid 20% Dipropylene-glycol monochromen-butyl ether 10% Propylene-glycol monoethyl ether 10% Thiodiglycol 12% Tripropylene glycol 3% 1, 3-dimethyl-2-imidazolidinone 5% Water Residue example D5 Direct special black AXN 4% Propylene-glycol monochromen-butyl ether 9% Dipropylene-glycol monomethyl ether 12% thiodiglycol 15% 1, 2-propanediol 4% N-methyl pyrrolidone 5% Water Residue [0056] Example D6 C.I. reactive red 6 4% Propylene-glycol monochromen-butyl ether 9% Dipropylene-glycol monochromen-butyl ether 5% Diethylene-glycol monochromen-butyl ether 15% Thiodiglycol 20% 1, 3-butanediol 2% N-acyl methyl taurine sodium 1.5% Water Residue example D7 C. The I. basic yellow 11 5% Propylene-glycol monochromen-butyl ether 10% Triethylene-glycol monobutyl ether 2% Glycerol 10% Trimethylol propane 3% Trimethylethane 1% The polyethylene glycol of number average molecular weight 400 1% Thiodiglycol 30% SAFI Norian 465 0.5% Water Residue example D8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochromen-butyl ether 10% Diethylene-glycol monochromen-t-butyl ether 5% Diethylene-glycol monochromen-butyl ether 5% Diethylene glycol 10% Thiodiglycol 0.5% 1, 3-propanediol 5% Water Residue [0057] Example D1 of comparison C.I. direct green 1 3% Diethylene-glycol monochromen-butyl ether 5% Ethylene glycol 15% Potassium hydroxide 0.1% Water Example D2 of residue comparison C.I. direct black 154 2.5% Diethylene-glycol monochromen-butyl ether 15% Diethylene glycol 5% Glycerol 10% Water Example D3 of residue comparison C.I. ashy dreadlocks 254 2.5% Diethylene-glycol monochromen-butyl ether 7% Diethylene glycol 15% Water Residue [0058] It printed on the various recording papers which show the ink constituent beyond evaluation examination D1 in the 4th table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 4th next table.

[0059]

[Table 4]

第 4 表

試験項目	紙の種類	実施例 D								比較例 D		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENAH BOND 紙	◎	◎	○	◎	○	◎	○	○	×	△	△
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
やまゆり紙	やまゆり紙	○	○	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×
ヒゲ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	MODO COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	やまゆり紙	○	○	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×

[0060] The concentration of a CHIOJI chestnut call was changed in the ink constituent of evaluation experiment D2 example D1 (the variation was adjusted with water). The intermittent printing time of the ink was measured. The result was as being shown in drawing 4.

[0061] Example E1~8 below Example E and the ink constituent of example E of comparison 1~3 were prepared according to the conventional method. In the following examples and examples of comparison, FUTAJIENTO 251 (product made from NEOSU, Inc.) was used as a fluorochemical surfactant.

Example E1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% Fluorochemical surfactant 0.02% Water Residue example E2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 3% Fluorochemical surfactant 0.03% Urea 5% Water

Since it became timeout time, translation result display processing is stopped.

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EXAMPLE

[Example] Although the following examples explain this invention still in detail, this invention is not limited to these examples. in addition -- unless especially printing is refused in the following examples -- the SEIKO EPSON incorporated company make -- ink jet printer MJ-500 performed Moreover, it is weight % unless especially % refuses below. Furthermore, ink constituents other than Example A and the example A of comparison come to contain 0.001 – 0.005% (recording head the corrosion prevention of a member sake) of benzotriazols pro cheating-on-the-fare XL-2 (corrosion inhibitor)0.1–1%.

[0032] Example A1–8 below Example A and the ink constituent of example A of comparison 1–3 were prepared according to the conventional method. That is, it agitated and mixed, and the following composition was filtered with the filter after that, and was used as the ink constituent. Example A1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Diethylene glycol monoethyl ether 10% 1, 4-butanediol 5% Sodium dioctyl sulfosuccinate 1.5% Water Residue example A2 C.I. hood black 192.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 5% Pro KUSERU GXL 0.3% Water Residue example A3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Diethylene glycol 5% Water Residue example A4 Special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 3-dimethyl-2-imidazolidinone 5% Water residue example A5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% N-methyl pyrrolidone 5% Water Residue [0033] Example A6 C.I. reactive red 6 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monochrome-n-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 15% N-acyl methyl taurine sodium 1.5% Water Residue example A7 C.I. basic yellow 11 5% Propylene-glycol monochrome-n-butyl-ether 10% Triethylene-glycol monobutyl ether 12% Glycerol 10% SAFI Norian 465 1% SAFI Norian 104 0.5% Water residue Example A8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-t-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 5% Diethylene glycol 10% Propylene glycol monomethyl ether Residue [0034] Example A1 of comparison C.I. direct green 1 3% Diethylene-glycol monochrome-n-butyl ether 5% Tetraethylene glycol 15% Potassium hydroxide 0.1% Water Example A2 of residue comparison C. The I. direct red 227 2.5% Diethylene-glycol monochrome-n-butyl ether 15% Triethylene glycol 5% Glycerol 10% Water Example A3 of residue comparison C.I. acid red 254 2.5% Diethylene-glycol monochrome-n-butyl-ether 7% Diethylene glycol 15% Water Residue [0035] It printed on the various recording papers which show the ink constituent beyond evaluation examination A1 in the 1st table. The printing was evaluated as follows.

Uneven osmosis of bleeding ink estimated on the following criteria whether the roundness of a dot fell.

O : roundness is very good.

O : although the fall of roundness is seen a little, it is satisfactory practically.

**: The fall of roundness is seen and they are those with a problem practically.

x: The fall of roundness is remarkable and is not suitable for practical use.

[0036] Along with the fiber of mustached paper, the following criteria estimated the grade of

uneven osmosis of ink, i.e., mustached **.

O : it is almost beardless and very good.

O : although a mustache is observed a little, there is no practical problem.

**: Many mustaches are observed and they are those with a problem practically.

x: Mustached generating is remarkable and is not suitable for practical use.

The above result was as being shown in the 1st next table.

[0037]

[Table 1]

第 1 表

試験項目	紙の種類	実施例 A								比較例 A		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	○	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENACH BOND 紙	◎	◎	○	○	○	◎	◎	◎	×	△	△
	RICOOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	◎	◎	○	○	○	◎	◎	◎	×	×	×
	XEROX R 紙	◎	◎	○	○	○	◎	◎	○	×	×	×

[0038] In addition, the recording paper of front Naka is available from the following.

CONQUEROR paper: — Arjo Wigging FAVORIT X paper: — Favorit Company MODO COPY

paper: — ModoRAPID COPY paper: — Igepa Company EPSON EPP paper: — SEIKO EPSON

company XEROX P paper: — Fuji Xerox shrine XEROX 4024 paper: — Xerox shrine XEROX 10

paper: — Xerox shrine NEENACH BOND paper: — Kimberly-Clark RICOOPY6200 paper: — Ricoh

Co., Ltd. and eyebrows ****: — Honshu Paper XEROX R Co., Ltd. paper: — Xerox [0039] In the

ink constituent of evaluation examination A2 example A1, the addition was changed in 2 - 35% of

range, setting the addition ratio to 2:1 for the organic solvent of diethylene-glycol-monoethyl-

ether and 1, and 4-butanediol (a part for the change was adjusted with water). 1micro of the ink

constituent I was dropped in the DERSCHER paper in the shape of a spot, the drying time was

made as measurement paper, and this was made into the penetration time. The result is shown

by — of drawing 1 .

[0040] Moreover, the addition was changed in the ink constituent of an example A1, replacing

PGmBE10% with 10% of SAFI Norian 465, and setting the addition ratio to 2:1 for diethylene-

glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time of the ink constituent was

measured like the above. The result is shown by O of drawing 1 . Furthermore, the addition was

changed in the ink constituent of an example A1, replacing PGmBE10% with 1% of SAFI Norian

465 10% of a ***** diethylene-glycol monochrome-n-butyl ether, and setting the addition

ratio to 2:1 for diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time

of the ink constituent was measured like the above. The result is shown as ** and ** of drawing 1, respectively.

[0041] In the ink constituent of evaluation examination A3 example A1, PGmBE and the diethylene glycol monoethyl ether changed the addition with the addition ratio of 1:1. The penetration time of the ink constituent was measured like the example A2. The result is shown as ** in drawing 2. Moreover, the penetration time of the ink constituent was measured like the above except having replaced PGmBE with DPgMBE. The result is shown as O in drawing 2.

[0042] Example B1-8 below Example B and the ink constituent of example B of comparison 1-3 were prepared according to the conventional method.

Example B1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Diethylene glycol monoethyl ether 10% 1, 4-butanediol 5% Urea 5% Dipropylene glycol 5% Water Residue example B-2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 5% 10% of ureas Pro KUSERU GXL 0.3% Water Residue example B3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Urea 7% Diethylene glycol 5% Water Residue example B4 Special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 3-dimethyl-2-imidazolidinone 5% 5% of thiourea Water Residue example B5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% N-methyl pyrrolidone 5% Ethylene urea 5% Water Residue [0043]

Example B6 C.I. reactive red 6 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monochrome-n-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 15% N-acyl methyl taurine sodium 1.5% BIUREA 3% Water Residue example B7 C.I. basic yellow 11 5% Propylene-glycol monochrome-n-butyl-ether 10% Triethylene-glycol monobutyl ether 12% Glycerol 10% SAFI Norian 465 1% SAFI Norian 104 0.5% Biuret 3% Water residue example B8 C.

The I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-t-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 5% Diethylene glycol 10% Tetramethylurea 3.5% Propylene glycol monomethyl ether Residue [0044]

Example B1 of comparison C.I. direct green 8 3% C.I. direct green 1 1% Diethylene-glycol monochrome-n-butyl ether 5% Tetraethylene glycol 15% Potassium hydroxide 0.1% Water Example B-2 of residue comparison C.I. direct red 227 2.5% Diethylene-glycol monochrome-n-butyl ether 15% Triethylene glycol 5% Glycerol 10% Water Example B3 of residue comparison C.I. acid red 254 2.5% Diethylene-glycol monochrome-n-butyl ether 7% Diethylene glycol 15% Water Residue [0045]

It printed on the various recording papers which show the ink constituent beyond evaluation examination B1 in the 2nd table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 2nd next table.

[0046]

[Table 2]

第2表

試験項目	紙の種類	実施例B								比較例B		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT I紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEBNACH BOND紙	◎	◎	○	◎	○	◎	◎	◎	×	△	△
	RICOPY 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	◎	◎	○	◎	○	◎	◎	◎	×	×	×
	XEROX R紙	◎	◎	○	◎	○	◎	◎	○	×	×	×
	CONQUEROR紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	FAVORIT I紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	MODO COPY紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	RAPID COPY紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	XEROX P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	RICOPY 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	やまゆり紙	◎	◎	◎	○	◎	○	○	◎	×	×	×
ヒゲ	XEROX R紙	◎	◎	○	◎	○	◎	◎	○	×	×	×

[0047] OD value of the printing object by the ink constituent of evaluation examination B-2 example B1-8 was measured. Moreover, these ink constituents and the same ink constituent were prepared except having not added a urea or a urea denaturation object. OD value of the printing object by this ink constituent was measured. The ratio of OD value was obtained from the following formula.

the ratio of OD value — =(A/B) X100-100 — here, OD value when A adds a urea or a urea denaturation object, and B are OD values at the time of not adding a urea or a urea denaturation object The ratio of OD value was as follows.

[0048]

Example Ratio 1 of OD value 8.82 9.73 7.74 9.25 6.56 2.37 3.28 1.5 [0049] The addition of a urea was changed in the ink constituent of evaluation experiment B3 example B1 (the variation was adjusted with water). OD value of the printing object by the ink constituent was measured. The result met as shown in drawing 3 .

[0050] Example C1-8 below Example C and the ink constituent of example C of comparison1-3 were prepared according to the conventional method.

Example C1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% 2-pyrrolidone 1.5% Water Residue example C2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 3% Tripropylene glycol 3% Urea 5% Water Residue example C3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Propylene glycol 5% Triethylene glycol 5% 1,5-pentanediol 5% Water A residue example C4 special black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% 1, 6-hexandiol 2% Tripropylene glycol 3% 1, 3-dimethyl-2-imidazolidinone 5% Water Residue example C5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl-ether 9% Dipropylene-glycol monomethyl ether 12% 2-methyl-2, 4-pentanediol 5% 1, 2-propanediol 4% N-methyl pyrrolidone 5% Water Residue [0051] Example C6 C.I. reactive red 6 4% Propylene-glycol

monochrome-n-butyl ether 9% Dipropylene-glycol monochromen-butyl ether 5% Diethylene-glycol monochromen-butyl ether 15% Neopentyl glycol 2% 1, 3-butanediol 2% N-acyl methyl taurine sodium 1.5% Water Residue example C7 C.I. basic yellow 11 5% Propylene-glycol monochromen-butyl ether 10% triethylene-glycol monobutyl ether 12% Glycerol 10% Trimethylol-propane 3% Trimethylolethane 1% The polypropylene glycol of number average molecular weight 400 1% SAFI Norian 465 1% SAFI Norian 104 0.5% Water Residue example C8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochromen-butyl-ether 10% Diethylene-glycol monochromen-t-butyl ether 5% Diethylene-glycol monochromen-butyl ether 5% Diethylene glycol 10% Tetrapropylene glycol 2% 1, 3-propanediol 5% Water Residue [0052] Example C1 of comparison C.I. direct green 1 3% Diethylene-glycol monochromen-butyl ether 5% Ethylene glycol 15% Potassium hydroxide 0.1% Water Example C2 of residue comparison C.I. direct red 227 2.5% Diethylene-glycol monochromen-butyl ether 15% Diethylene glycol 5% Glycerol 10% Water Example C3 of residue comparison C.I. ashy dreadlocks 254 2.5% Diethylene-glycol monochromen-butyl ether 7% Diethylene glycol 15% Water Residue [0053] It printed on the various recording papers which show the ink constituent beyond the evaluation examination C in the 3rd table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 3rd next table.

[0054]

[Table 3]

第 3 表

試験項目	紙の種類	実施例 C								比較例 C		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	FAVORIT I 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENACH BOYD 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	△
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	◎	◎	○	◎	○	◎	◎	◎	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×

[0055] Example D1-8 below Example D and the ink constituent of example D of comparison 1-3 were prepared according to the conventional method.

Example D1 C.I. direct black 19 2% Propylene-glycol monochromen-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% Thiodiglycol 5% Water Residue example D2 C.I. hood black 2 2.5% Propylene-glycol monochromen-butyl ether 10% Diethylene-glycol monochromen-n-butyl ether 10% Dipropylene glycol 3% Thiodiglycol 3% Urea 5% Water Residue example D3 C.I. acid green 9 2.5% Propylene-glycol monochromen-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Propylene glycol 5% Thiodiglycol 5% 1,5-pantanediol 5%

Water Residue example D4 Vice crypt black SP liquid 20% Dipropylene-glycol monochrom-n-butyl ether 10% Propylene-glycol monoethyl ether 10% Thiodiglycol 12% Tripropylene glycol 3% 1, 3-dimethyl-2-imidazolidinone 5% Water Residue example D5 Direct special black AXN 4% Propylene-glycol monochrom-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% Thiodiglycol 15% 1, 2-propanediol 4% N-methyl pyrrolidone 5% Water Residue [0056] Example D6 C.I. reactive red 6 4% Propylene-glycol monochrom-n-butyl ether 9% Dipropylene-glycol monochrom-n-butyl ether 5% Diethylene-glycol monochrom-n-butyl ether 15% Thiodiglycol 20% 1, 3-butanediol 2% N-acyl methyl taurine sodium 1.5% Water Residue example D7 C. The I. basic yellow 11 5% Propylene-glycol monochrom-n-butyl ether 10% Triethylene-glycol monobutyl ether 2% Glycerol 10% Trimethylol propane 3% Trimethylethane 1% The polyethylene glycol of number average molecular weight 400 1% Thiodiglycol 30% SAFI Norian 465 0.5% Water Residue example D8 C.I. direct green 1 3% C.I. direct green 28 1% Propylene-glycol monochrom-n-butyl ether 10% Diethylene-glycol monochrom-t-butyl ether 5% Diethylene-glycol monochrom-n-butyl ether 5% Diethylene glycol 10% Thiodiglycol 0.5% 1, 3-propanediol 5% Water Residue [0057] Example D1 of comparison C.I. direct green 1 3% Diethylene-glycol monochrom-n-butyl ether 5% Ethylene glycol 15% Potassium hydroxide 0.1% Water Example D2 of residue comparison C.I. direct black 154 2.5% Diethylene-glycol monochrom-n-butyl ether 15% Diethylene glycol 5% Glycerol 10% Water Example D3 of residue comparison C.I. ashy dreadlocks 254 2.5% Diethylene-glycol monochrom-n-butyl ether 7% Diethylene glycol 15% Water Residue [0058] It printed on the various recording papers which show the ink constituent beyond evaluation examination D1 in the 4th table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 4th next table.

[0059]

[Table 4]

第 4 表

試験項目	紙の種類	実施例 D								比較例 D		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON BPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEBNACH BOND 紙	◎	◎	○	◎	○	◎	○	○	×	△	△
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
やまゆり紙	やまゆり紙	○	○	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×
ヒゲ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	MODO COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	RICOPY 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	やまゆり紙	○	○	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×

[0060] The concentration of a CHIOJI chestnut call was changed in the ink constituent of evaluation experiment D2 example D1 (the variation was adjusted with water). The intermittent printing time of the ink was measured. The result was as being shown in drawing 4.

[0061] Example E1–8 below Example E and the ink constituent of example E of comparison 1–3 were prepared according to the conventional method. In the following examples and examples of comparison, FUTAJIENTO 251 (product made from NEOSU, Inc.) was used as a fluorochemical surfactant.

Example E1 C.I. direct black 19 2% Propylene-glycol monochrome-n-butyl ether 10% Triethylene-glycol monobutyl ether 10% 1, 4-butanediol 2.5% 1, 6-hexandiol 2.5% Fluorochemical surfactant 0.02% Water Residue example E2 C.I. hood black 2 2.5% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-n-butyl ether 10% Dipropylene glycol 3%

Fluorochemical surfactant 0.03% Urea 5% Water Residue example E3 C.I. acid green 9 2.5% Propylene-glycol monochrome-n-butyl ether 10% 1-methyl-1-methoxybutanol 15% Propylene glycol 5% Fluorine surfactant 0.1% 1,5-pentanediol 5% Water Residue example E4 Vice crypt black SP liquid 20% Dipropylene-glycol monochrome-n-butyl ether 10% Propylene-glycol monoethyl ether 10% Fluorochemical surfactant 0.2% Tripropylene glycol 3% 1, 3-dimethyl-2-imidazolidinone 5% Water Residue example E5 Direct special black AXN 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monomethyl ether 12% Fluorochemical surfactant 1 ppm 1, 2-propanediol 4% N-methyl pyrrolidone 5% Water Residue [0062] Example E6 C.I. reactive red 6 4% Propylene-glycol monochrome-n-butyl ether 9% Dipropylene-glycol monochrome-n-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 15% Fluorochemical surfactant 1.0% 1, 3-butanediol 2% N-acyl methyl taurine sodium 1.5% Water Residue example E7 C.I. basic yellow 11 5% Propylene-glycol monochrome-n-butyl ether 10% triethylene-glycol monobutyl ether 2% glycerol 10% TORIMETE roll propane 3% TORIMETE roll ethane 1% The polyethylene glycol of number average molecular weight 400 1% Fluorochemical surfactant 0.3% SAFI Norian 465 0.5% Water Residue example E8 C.I. direct green 1 3% C.I. direct green 281% Propylene-glycol monochrome-n-butyl ether 10% Diethylene-glycol monochrome-t-butyl ether 5% Diethylene-glycol monochrome-n-butyl ether 5% Diethylene glycol 10% Fluorochemical surfactant 0.5% 1, 3-propanediol 5% Water Residue [0063] Example E1 of comparison C.I. direct green 1 3%

Diethylene-glycol monochrome-n-butyl ether 5% Ethylene glycol 15% Potassium hydroxide 0.1% Water Example E2 of residue comparison C.I. direct red 154 2.5% Diethylene-glycol monochrome-n-butyl ether 15% Diethylene glycol 5% Glycerol 10% Water Example E3 of residue comparison C.I. ashy dreadlocks 254 2.5% Diethylene-glycol monochrome-n-butyl ether 7% Diethylene glycol 15% Water Residue [0064] It printed on the various recording papers which show the ink constituent beyond the evaluation examination E in the 5th table. The printing was evaluated like the evaluation examination A. The result was as being shown in the 5th next table.

[0065]

[Table 5]

第 5 表

試験項目	紙の種類	実施例 E								比較例 E		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	○	○	○
	FAVORIT X 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	MODO COPY 紙	◎	◎	○	◎	○	◎	◎	◎	×	△	×
	RAPID COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX P 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	XEROX 4024 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	XEROX 10 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	NEENACH BOND 紙	◎	◎	○	◎	○	◎	○	○	×	△	△
	RICOH 6200 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
ヒゲ	やまゆり紙	○	○	○	○	○	○	○	○	×	×	×
	XEROX R 紙	◎	◎	○	◎	○	◎	○	○	×	×	×
	CONQUEROR 紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	FAVORIT I 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	MODO COPY 紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] In the ink constituent of an example A1, the addition ratio has been set to 2:1 for the organic solvent of diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time of the ink constituent to which the addition was changed in 2 – 35% of range (-), Replace PGmBE10% with 10% of SAFI Norian 465, and the addition ratio has been set to 2:1 for diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The penetration time (O) of the ink constituent to which the addition was changed, and PGmBE10% 10% of the ***** diethylene-glycol monochrome-n-butyl ether, replace with 1% of SAFI Norian 465, and the addition ratio has been set to 2:1 for diethylene-glycol-monoethyl-ether and 1, and 4-butanediol. The graph which shows the penetration time (** and **) of the ink constituent to which the addition was changed.

[Drawing 2] The graph which shows the penetration time (**) of the ink constituent to which PGmBE and the diethylene glycol monoethyl ether changed the addition with the addition ratio of 1:1, and the penetration time (O) of the same ink constituent as the example A1 which replaced PGmBE with DPGmBE in the ink constituent of an example A1.

[Drawing 3] The graph which shows OD value of the printing object by the ink constituent to which the addition of a urea was changed in the ink constituent of an example B1.

[Drawing 4] The graph which shows the intermittent printing time of the ink constituent to which the concentration of a thiodiglycol was changed in the ink constituent of an example D1.

[Translation done.]